



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,230	02/04/2002	John T. Vaughey	215	7626

7590 03/02/2004

EMRICH & DITHMAR
SUITE 3000
300 SOUTH WACKER DRIVE
CHICAGO, IL 60606

EXAMINER

CHANEY, CAROL DIANE

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/068,230

Applicant(s)

VAUGHEY ET AL.

Examiner

Carol Chaney

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 04 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Drawings

The drawings are objected to under 37 CFR 1.83(a) because they fail to show the structure of Cu_2Sb as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Applicants' illustration of a Cu_2Sb type structure in Figure 1 fails to provide details essential for a proper understanding of applicants' invention because only a two-dimensional view of the three dimensional structure is given, and the illustration appears to show three different types of atoms but identifies only two types, namely M' and M.

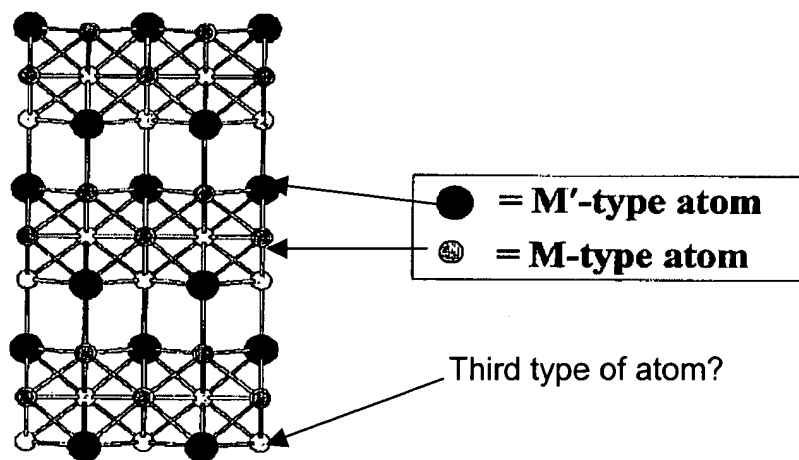


FIGURE 1

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

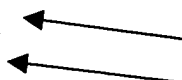
Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The recitation of "Cu₂Sb type structure" is indefinite because it is unclear if the term is intended to encompass compounds with the same space group as the pristine Cu₂Sb; compounds with the same space group and lattice parameters as Cu₂Sb; compounds which can intercalate Li ions by a rearrangement and "extrusion" of a metal in the original lattice; or another definition.



Claim 2 is dependent upon claim 1, which requires a structure, which is interpreted as a crystalline structure. Claim 2 further requires a "fully disordered structure or a partially disordered structure". This recitation is interpreted as describing an amorphous or partially amorphous material. Thus, claim 2 requires a material which is simultaneously crystalline (claim 1) and amorphous (claim 2). The type of material applicants intend to claim in claim 2 is therefore indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-12, 14, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Inagaki et al., US Patent 6,541,157.

Inagaki et al. disclose nonaqueous batteries using Mn_2Sb or Cu_2Sb as the negative electrode active material. (See column 10, lines 64-65.) In addition, $Li_{0.01}Cu_2Sb$ is also disclosed as a negative electrode active material. (See column 11, line 16, embodiment 58.) In this example, Li and Cu together correspond to metal M, and Sb is M'. Therefore, the M:M' ratio is non-stoichiometric and is 2.01:1, which is within the ranges recited in claims 3 and 4. With regards to claims 8 and 9, the

Art Unit: 1745

recitations of "to the extent of 20 atom percent or less" and "to the extent of 50 atom percent or less" are interpreted as encompassing 0 atom percent, so that the Inagaki et al. disclosure of Mn_2Sb or Cu_2Sb anode materials meet the limitations of applicants' claims 8 and 9.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inagaki et al.

As discussed above, Inagaki et al. disclose applicants' invention essentially as claimed, with the exception that in regards to claim 13 Inagaki et al. do not disclose anode materials with P or As as an M' material, and in regards to claims 15 and 17 Inagaki et al. do not specifically disclose batteries containing a plurality of cells.

The anode material disclosed by Inagaki et al. is of the form A_zMX_y where A is at least one element selected from the alkali metals, M is at least one element selected from the group consisting of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Pt, and Mg, and X is at least one element selected from the group consisting of B, N, Al, Si, P, Ga, Ge, As, In, Sn, Sb, Pb, and Bi, $0 \leq z \leq 20$, and $0.2 \leq y \leq 6$. Cu_2Sb and Mn_2Sb are preferred embodiments of the Inagaki et al. invention; P and As are

Art Unit: 1745

suggested along with Sb by Inagaki et al. as 'X' elements; and P, As and Sb are all Group VA elements and thus expected to have similar chemical properties. Therefore, it would have been obvious to one of ordinary skill in the art to choose Cu_2P , Cu_2As , Mn_2P or Mn_2As as an anode material because they are chemically analogous with a preferred embodiment of the Inagaki et al. invention. With regards to claims 15 and 17, these claims recite a plurality of the cells which have been disclosed by Inagaki et al. The duplication of parts (for a multiplied effect) has been shown to be obvious unless a synergistic effect can be shown. See *St. Regis Paper Co. v. Bemis Co., Inc.*, 193 USPQ 8, 11, (7th Cir.) 1977. Since the results of connecting battery cells together, both in series and parallel, are well-understood applicants' invention of claims 15 and 17 would have been obvious to one of ordinary skill in the art based upon the Inagaki et al. disclosure.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Saito et al., US Patent 5,770,333 discloses inter-metallic anode materials for non-aqueous secondary batteries.

Thackeray et al., "Structural considerations of intermetallic electrodes for lithium batteries", *Journal of Power Sources* (2003) 113(1) 124-130.

Fransson et al., "Phase transitions in lithiated Cu₂Sb anodes for lithium batteries: an in-situ X-ray diffraction study" *Electrochemistry Communications* (2001), 3(7) 317-323.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol Chaney whose telephone number is (571) 272-1284. The examiner can normally be reached on Mon - Fri 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Carol Chaney
Primary Examiner
Art Unit 1745